National Aeronautics and Space Administration

NASAfacts

# PDRC

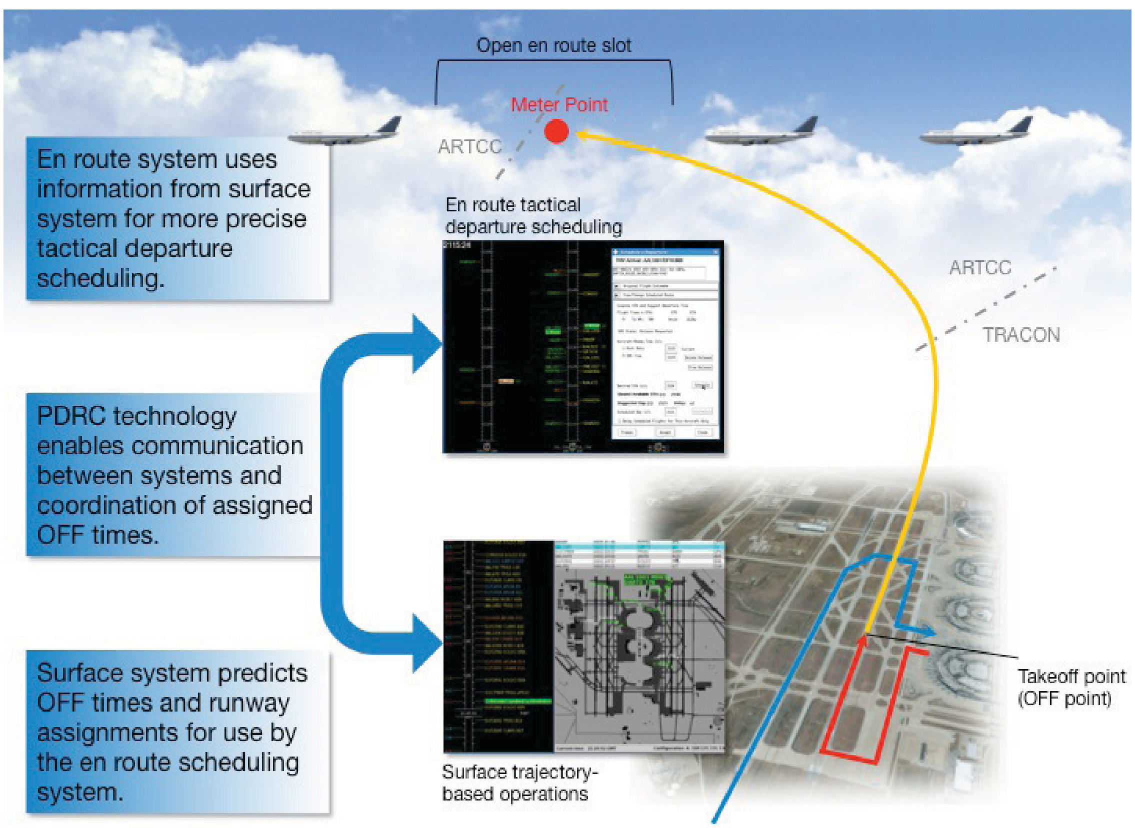
## Precision Departure Release Capability

### Today's Operations

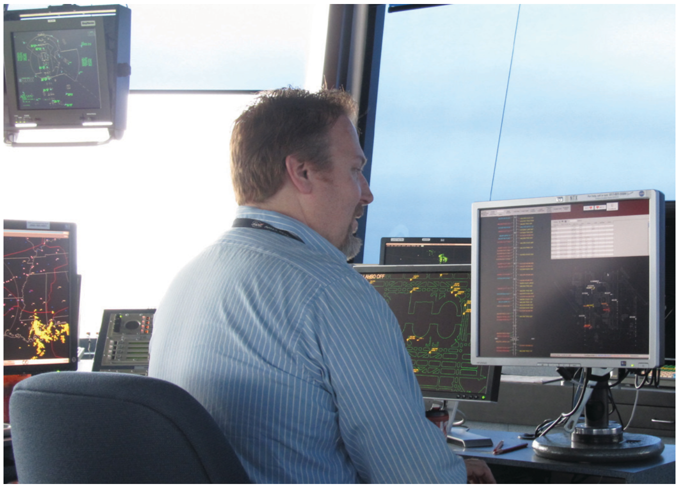
After takeoff, aircraft must merge into en route (Center) airspace traffic flows, much like cars merging onto busy freeways. During normal air traffic operations, Center airspace has sufficient capacity to readily accommodate these merging departures. During periods of high demand or low capacity, however, the overhead flow of aircraft has fewer slots available to try and fit merging departures.

In these situations, Traffic Management Coordinators (TMCs) often use a process called Tactical Departure Scheduling to ensure that the demand placed on local airspace resources does not exceed the available capacity. Tactical departure scheduling focuses on specific air traffic flows and generally introduces manageable departure delays to specific aircraft on an as-needed basis to avoid crowding the airspace.

A commonly used tactical departure scheduling practice is the Call For Release (CFR) procedure. The CFR procedure is a collaborative effort between airport Tower TMCs, responsible for releasing departing aircraft, and the Center TMCs, responsible for meeting the overhead flow constraints, to schedule a departure time prior to releasing aircraft into constrained en route airspace. Typically in CFR, Tower TMCs manually predict the earliest time at which the aircraft could be ready for takeoff, then call the Center TMCs to communicate the predicted time. The Center TMCs enter the predicted takeoff time into a decision support tool that identifies the next available open slot at the merge point in the overhead flow and




PDRC Concept Overview



A TMC in the air traffic control tower at Dallas/Fort Worth International Airport (shown here) uses PDRC to coordinate departure release times with a TMC in the en route Center.

assigns a three-minute departure time window that incorporates any required delay to fit into the available slot, regardless of the actual delay requirement. The resulting departure time window is verbally communicated back to the Tower TMCs who evaluate the traffic situation on the airport surface to determine if the CFR time can be met. If so, any additional delay needed to meet the time will be achieved by holding the flight in the departure queue or at the runway threshold. If the CFR time cannot be met, the CFR process begins again to negotiate a new departure time between the Center and Tower TMCs.

## What is the problem?

In present-day operations, manual takeoff time prediction and verbal release time coordination are labor intensive and prone to inaccuracy. Also, takeoff time windows add uncertainty to the departure process. Analysis of national airspace system (NAS) operational data from January 2011 indicates that a significant number of tactically scheduled aircraft did not meet their scheduled departure slot due to departure time prediction uncertainty. Uncertainty in takeoff time estimates may result in missed opportunities to merge into constrained en route flows and lead to lost throughput. In addition, the operational data analysis identified increased controller and TMC workload associated with vectoring and/or speed adjustments that were required in order for aircraft to meet their assigned slots.

## What is NASA doing to help?

NASA is developing the ***Precision Departure Release Capability (PDRC)***, which automates portions of the Tactical Departure Scheduling process. Specifically, PDRC's surface automation component predicts the earliest achievable takeoff times for departure flights and the departure runway. For flights subject to CFR restrictions, the predicted departure times and runways are automatically communicated to the Center automation component which computes ascent trajectories from the takeoff point to the merge point in the overhead flow as well as target departure times that will achieve those trajectories. Instead of a fixed takeoff time window, PDRC automatically transmits a scheduled takeoff time to the surface system that is precise to the seconds level. PDRC's reduced departure time uncertainty results in better accuracy in meeting slot times, reduced controller workload in mitigating missed or unattainable slots, and increased flight efficiency due to a reduction in airborne vectoring and speed adjustments.

NASA developed a PDRC prototype and conducted a two-phase field evaluation at NASA's North Texas Research Station (NTX) in Dallas/Fort Worth. The field evaluation (May - July 2012, and November 2012 - February 2013) validated the PDRC concept, assessed system performance, and evaluated enhancements that provide Tower controllers with greater insight into en route traffic conditions. During the evaluation, Federal Aviation Administration (FAA) TMCs at Fort Worth Center and Dallas/Fort Worth International Airport used the prototype PDRC system to schedule actual operational departures subject to traffic management restrictions. NASA will formally transfer the core elements of PDRC technology to the FAA in the summer of 2013. The FAA will use PDRC to help integrate tower and en route decision support tools being developed for the next generation air transportation system (NextGen).

For more information on the Precision Departure Release Capability (PDRC), please visit **www.aviationsystems.arc.nasa.gov.**

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